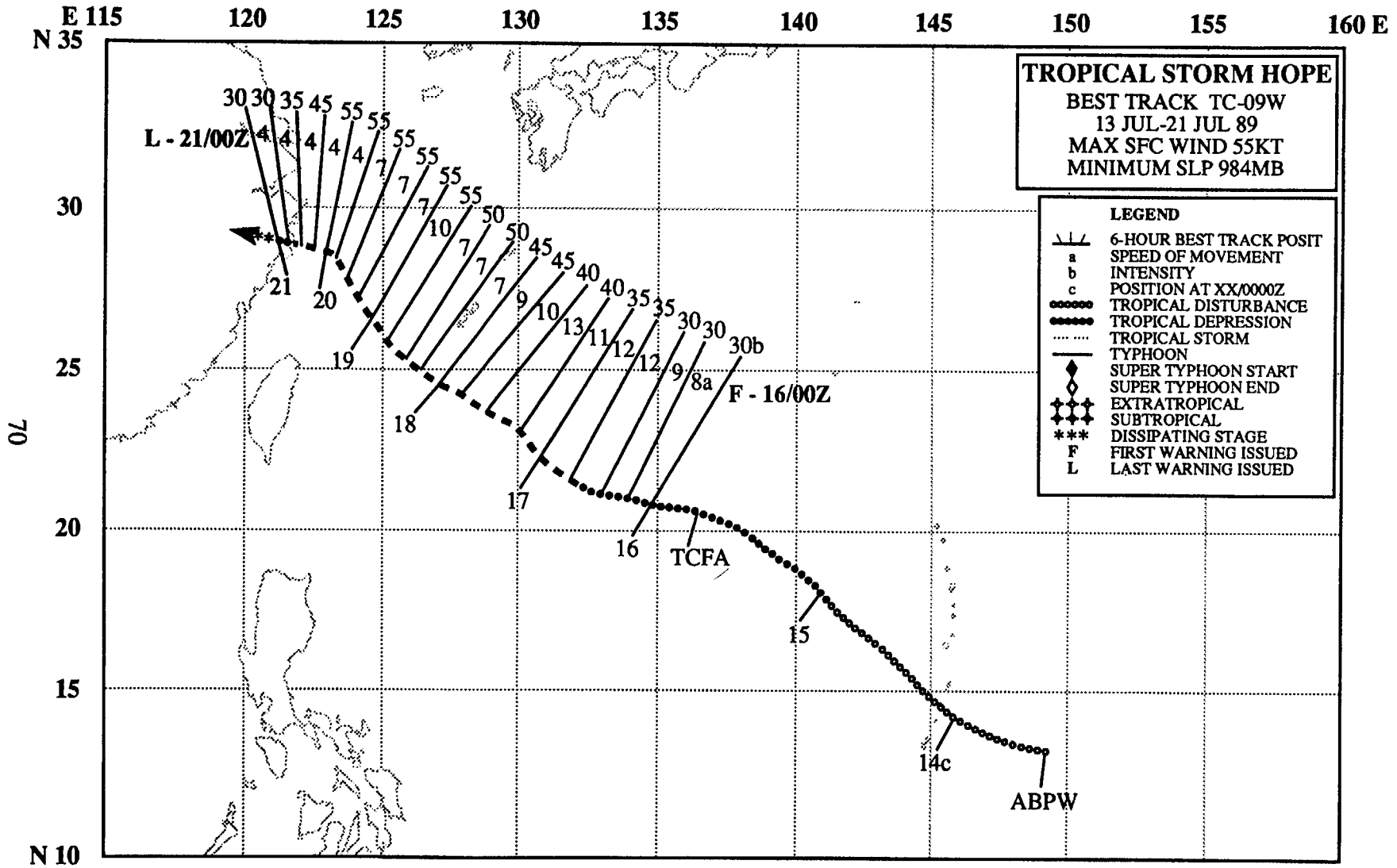
E 115
120
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TROPICAL STORM HOPE
BEST TRACK TC-09W
13 JUL-21 JUL 89
MAX SFC WIND 55KT
MINIMUM SLP 984MB
LEGEND
6-HOUR BEST TRACK POSIT
a SPEED OF MOVEMENT
b INTENSITY
c POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
*** DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED
L - 21/00Z
F - 16/00Z
TCFA
ABPW
30 30 35 45 55 55
4 4 4 4 4 7
7 7 55 55 55
7 10 50 50
7 7 45 45
7 9 40 40
10 13 35 35
11 12 30 30
12 9 8a 30b
21
20
19
18
17
16
15
14c

TROPICAL STORM HOPE (09W)

The third of seven tropical cyclones to form in July, Hope was a TUTT-induced tropical cyclone that failed to develop to typhoon intensity as a result of the upper-level shear from outflow from Super Typhoon Gordon (08W). During its life, Hope moved generally northwestward , occasionally "stair-stepping" in response to the passage of a series of mid-latitude short-wave troughs. Although no binary interaction was apparent, the tropical cyclone tracked along the periphery of Gordon's low-level inflow for most of its lifetime.

Hope generated in the wake of Gordon (08W) in a broad area of convection enhanced by the divergence aloft associated with a TUTT cell. When the convection persisted for more than 18 hours, it was included as a suspect area on the Significant Tropical Weather Advisory at 130600Z. Synoptic data indicated a low-level cyclonic circulation embedded in the convection. Surface winds were estimated to be 10 to 20 kt (5 to 10 m/sec) and the MSLP 1007 mb. During the next 48 hours, the convection became disorganized due to increased vertical wind shear aloft from Super Typhoon Gordon (08W), which was intensifying to the west. A weak surface circulation persisted in the synoptic data.

At 151740Z JTWC issued a Tropical Cyclone Formation Alert when Hope's central convection increased after the combined restrictive effects of the passage of a mid-latitude trough to the north and outflow from Gordon (08W) to the west decreased. Winds in the area were estimated to be 20 to 30 kt (10 to 15 m/sec). The first warning followed at 160000Z. Tropical Depression 09W tracked westward for the next 18 hours under the influence of the building mid-tropospheric subtropical ridge to the north. The low-level circulation center remained partially exposed until 161800Z, when a central dense overcast formed. In response, Hope intensified to 35 kt (17 m/sec) and was upgraded to a tropical storm.

Late on 16 July, Hope's track returned to the northwest in contrast to the guidance provided by the NOGAPS forecast fields, which indicated the subtropical ridge would remain intact despite the approach of a series of short-wave troughs. The NOGAPS guidance was reinforced by the statistical-dynamic aid CSUM. As a result, JTWC adjusted the forecast track southward with each succeeding warning until, by 171800Z, Hope was forecast to pass near Taiwan. However, the tropical cyclone remained north of the forecast track and slowly intensified. Kadena AB (WMO 47931) on Okinawa, approximately 100 nm (185 km) northeast of the tropical storm, measured a peak gust of 31 kt (16 m/sec) at 180411Z.

From 180000Z through 191800Z the

synoptic situation was complex (Figure 3-09-1). Hope responded to another short-wave trough and tracked north-northwestward . Once again JTWC abandoned the westward track into China and changed the forecast track to take Hope through a possible break in the subtropical ridge into the East China Sea and then on to Korea. The change in track was prompted by several factors: (1) the failure of the expected westward movement to develop, (2) the possibility that NOGAPS was overforecasting the strength in the ridge to the north, (3) the expectation that Hope would remain a shallow system and be influenced by the more southerly low- to mid-level steering flow rather than the weak easterly mid- to upper-level flow, and (4) guidance from the dynamic aid OTCM. However, after the passage of another short-wave trough, the ridge strengthened north of Hope. At 200000Z, the tropical storm (Figure

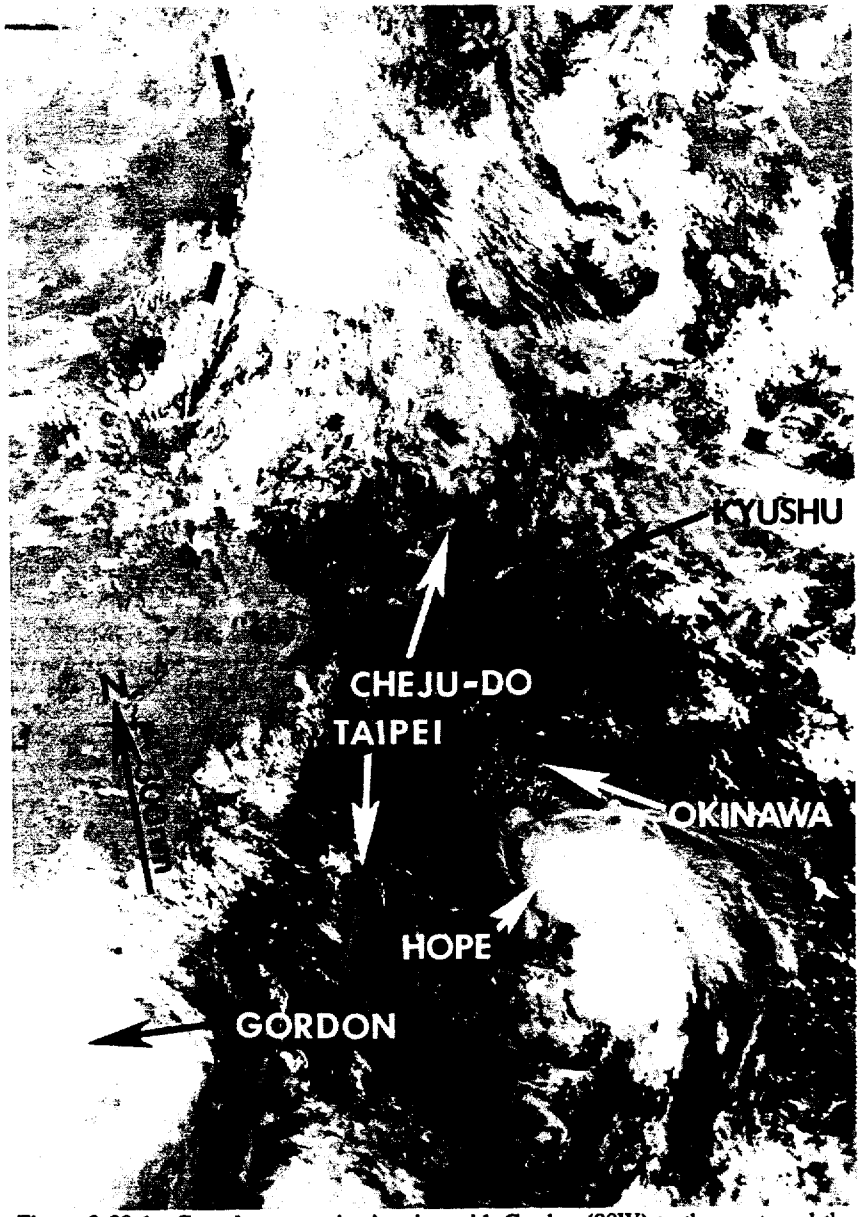

Figure 3-09-1. Complex synoptic situation with Gordon (08W) to the west, and the mid-latitude trough to the north. The island of Okinawa is nearby (172338Z July NOAA visual image.;).

3-09-2) executed an abrupt turn to the west and moved into mainland China.

While Hope was over warm ocean waters, it intensified slowly, reaching its peak intensity of 55 kt (27 m/sec) at 181800Z. However, the northeasterly upper-level flow restricted Hope's outflow and prevented further development into a typhoon. Hope was downgraded to a tropical depression at landfall. The tropical cyclone weakened rapidly as it moved over land, and the final warning was issued at 210000Z. News reports indicated that at least 24 people died and more than 1000 were injured in eastern China. In addition, landslides and widespread flooding resulted from locally heavy rains. Totals up to 7.5 inches (109 mm) in 24 hours were recorded in some areas.

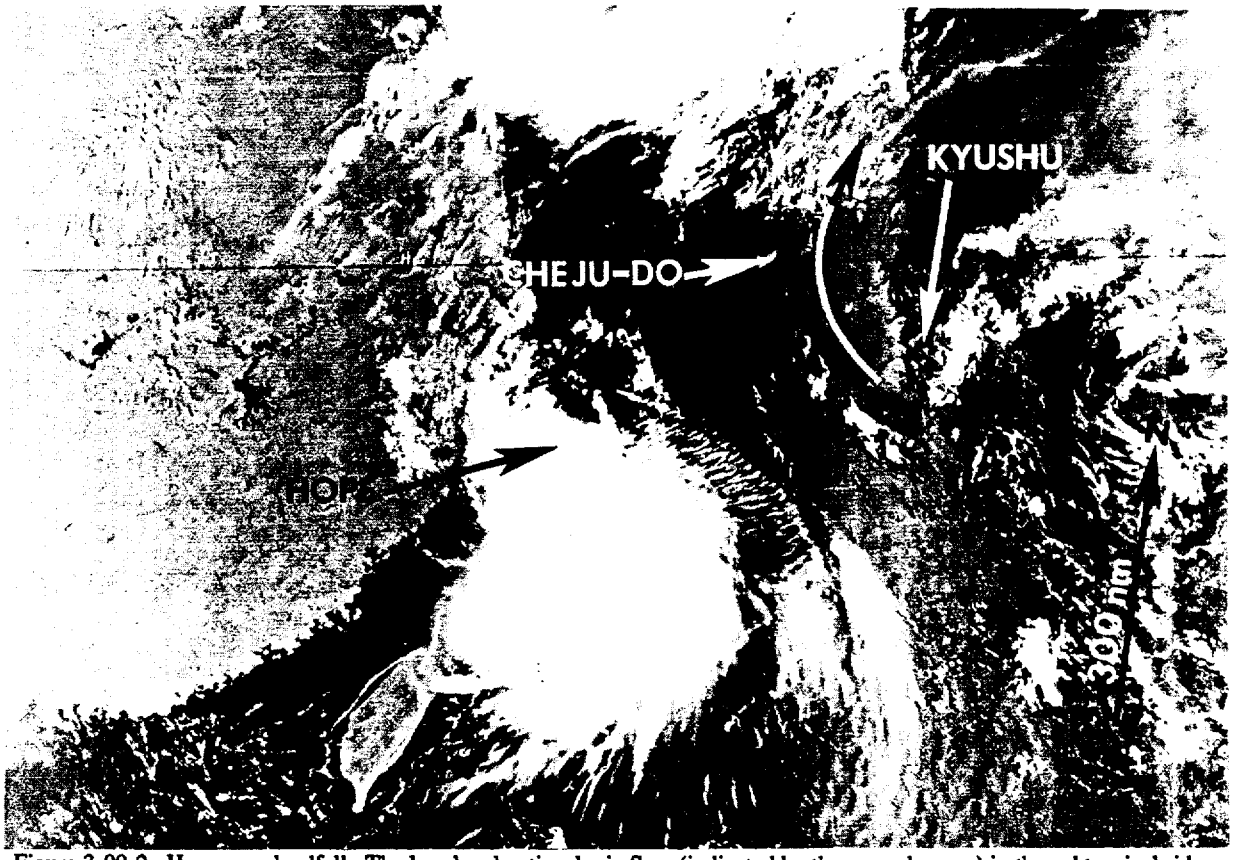

Figure 3-09-2. Hope near landfall. The low-level anticyclonic flow (indicated by the curved arrow) in the subtropical ridge is defined by the cumulus streets across southern Korea, coastal China, and the brightness pattern in the lee of Kyushu. Frontal cloudiness associated with the passing trough trails across central Korea and the Yellow Sea (200046Z July DMSP